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ABSTRACT OF THE DISCLOSURE

A spectral analysis module, including a wavemeter, for a high repetition rate gas discharge laser having a laser output beam comprising a pulsed output of greater than or equal to 15 mJ per pulse, sub-nanometer bandwidth tuning range pulses having a femptometer bandwidth precision and tens of femptometers bandwidth accuracy range, for measuring bandwidth on a pulse to pulse basis at pulse repetition rates of 4000Hz and above, is disclosed which may comprise a primary beam-splitter in the path of the laser output laser of the gas discharge laser operative to pass the vast majority of the output beam and to reflect a first small portion of the output beam, the primary beam splitter oriented at an angle to sufficiently reduce the fluence on the primary beam-splitter, and creating overlapping fresnel reflections in the first small portion of the laser output beam; a secondary beam splitter made from a material having a damage threshold sufficiently high to tolerate the fluence created by the overlapping portion of the fresnel reflections in the first small portion of the output laser beam, the secondary beam splitter reflecting the vast majority of the first small portion of the output laser beam and passing a second small portion of the output laser beam; a telescoping optic in the path of the second small portion of the output beam operative to demagnify the second small portion of the output beam onto a first stage diffuser receiving the demagnified second small portion of the output laser beam, the demagnification selected to keep the fluence in the overlapping fresnel reflections in the second small portion of the output laser beam below the damage threshold of the first stage diffuser. The telescoping optic may demagnify a long axis of the second small portion of the output laser beam more than a short axis of the second small portion of the output laser beam, redistributing the fluence of the second small portion of the laser output beam across the first stage diffuser to keep any portion of the first stage diffuser from exceeding the damage threshold for the material from which the first stage diffuser is made. The vast majority of the first small portion of the laser output beam may be reflected into a power detection module. A second stage diffuser may creating a narrow cone of a focused second small portion of the laser output beam before the beam enters an interferometer.